

FLOWERING PERIODICITY IN SOME WOODY PLANTS OF THE SOUTHERN BECHUANALAND PROTECTORATE.

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Though a good deal is probably known about the effects of climate in inducing, retarding and inhibiting flower production in cultivated plants, particularly orchard trees, but little seems to have been told us about these effects on wild-grown plants.

The time of flower, and consequently of fruit production, may have a considerable bearing on whether our savanna-woodlands are to survive. The degradation and, in places, the disappearance of indigenous woodland lessens its value as a means of slowing down wind velocity and thus helps to accelerate the rate of desiccation.

Survival of the woodland is dependent on natural regeneration. Regeneration in turn is dependent on protection against radiation, frost and fire. The time of flowering and fruiting must occur when conditions are most favourable. This factor will decide the future composition of the woodland and its effectiveness in reducing wind force. A year's observations on the flowering periods of a number of woody plants may therefore be of interest.

Again, close observation of flowering times may often assist the taxonomist in deciding whether or not to accord specific distinction to a plant which shows some minor difference or differences from the type specimen. It is suggested that where two or more plants differ only in some minor characteristics in flower or leaf, varietal rather than specific distinction is indicated if they are alike in general form and in time of flowering.

Table I gives rainfall and temperature figures at Kanye, a meteorological station $2\frac{1}{2}$ miles distant from Pharing where the observations were made during the period 1st October 1947 to 30th September 1948. These records show the average temperatures and rainfall during 20 years and those of the year preceding and of the year during which observations were made.

The following is a brief description of the locality where the observations were made. Pharing lies at the bottom of the northern face of Kanye Hill. The hill is flat topped, about 4,500 feet above sea-level with a shallow, sandy soil overlying Waterberg conglomerate. The hill sides are steep, the northerly slope dropping down 500 feet into the Mokgodumo

TABLE I.

MONTH.	RAINFALL in inches.			TEMPERATURE in degrees Fahrenheit.					
	Average.	1946-1947	1947-1948	Average.		1946-1947		1947-1948	
				Max.	Min.	Max.	Min.	Max.	Min.
Oct. ..	0.97	2.78	1.00	84.5	58.4	83.2	58.1	84.5	60.4
Nov. ..	2.96	1.79	2.47	83.9	61.0	85.7	60.4	88.1	63.1
Dec. ..	3.14	4.86	2.07	85.0	63.1	87.3	64.2	84.9	62.6
Jan. ..	3.68	3.58	5.98	85.6	63.3	88.6	64.0	83.1	62.7
Feb. ..	3.00	1.10	0.55	82.8	62.4	90.8	62.5	83.5	62.5
March ..	2.83	3.64	3.40	79.9	60.0	82.4	58.0	78.8	61.5
April ..	1.38	0.14	3.01	76.0	54.2	79.5	57.2	76.2	52.1
May ..	0.67	0.09	0.27	71.1	48.3	73.2	47.4	72.7	48.0
June ..	0.24	—	—	66.0	42.6	68.8	41.5	69.3	42.3
July ..	0.03	0.06	—	66.1	42.1	65.7	38.4	69.9	44.6
Aug. ..	0.21	—	—	71.4	45.8	77.4	50.5	75.9	49.3
Sept. ..	0.34	1.22	0.03	78.3	51.5	78.3	53.0	80.4	61.3
	19.45	19.26	18.78						

valley of which the bottom lands are alluvial. To the north-west the conglomerate is displaced by a large mass of dolerite. The ridge across the valley is felsite from which is derived a poor soil of varying depth. Immediately north of Pharing is a large dam, fed by storm water, and below the dam a small irrigation scheme with granite koppies on the north and south. The whole area, except for the dam, the irrigation lands and some flat land in the valley is clothed with savanna-woodland.

The woodland has suffered to some extent by its proximity to the large Bechuana village of Kanye with a population of 20,000 inhabitants. Partial protection has however been in force for some years under tribal law. The composition of the woodland may be learnt by consulting Table III.

Table II gives the total number of species of plants found in flower during each month. During the year of observation the Wild Olive, *Olea africana*, the Wild Syringa, *Burkea africana* and the Tomboti, *Spirostachys africana*, all common trees here, did not flower at all. This fact was to some degree checked by keeping a careful watch for young fruits.

Mundulea sericea, *Securidaca longipedunculata* and *Cussonia paniculata* are scarce round Pharing; some of them fruited but unfortunately their times of flowering were missed. *Euclea undulata* and *Combretum transvaalense* are common shrubs and their flowering was also not observed.

It was a poor flowering season for *Acacia litakunensis*, *Acacia robusta*, *Gardenia spathulifolia*, *Mimusops zeyheri* and *Peltophorum africanum*.

It was in fact a poor flowering year generally in the Protectorate outside the observation area. Very few of the very common *Acacia dulcis* flowered. *Boscia rehmanniana*, so plentiful round Mochudi, did not flower at all, while in the extreme north the Rhodesian Teak, *Baikiaea plurijuga* and Bloodwood or Kiaart, *Pterocarpus angolensis* produced few or no flowers.

Where a species only provided a single specimen in flower, it was not included in Table II.

TABLE II.

Month.	No. of spp.	Month.	No. of spp.
194		1948	
Oct.	28	March	9
Nov.	19	April	12
Dec.	26	May	13
		June	15
1948		July	11
Jan.	21	Aug.	12
Feb.	20	Sept.	18

Table III is a list of all species found in flower with the months of flowering. Remarks are added to those whose flowering for any reason is noteworthy. To complete the picture, the species which did not flower at all are also given.

TABLE III.

Species.	Months of Flowering.	Remarks.
<i>Acacia benthamii</i> ..	Dec.—Jan.	
<i>A. burkei</i>	Oct.	
<i>A. caffra</i>	Dec.—Jan. Aug.—Sept.	
<i>A. detinens</i>	Aug.—Sept.	1 plant had a few flrs in June—July. Heavy flrg on all trees in Aug.
<i>A. giraffae</i>	Aug.—Sept.	
<i>A. karroo</i>	Dec.—Jan.—Feb.	
<i>A. litakunensis</i>	Jan.	
<i>A. stolonifera</i>	Jan. Aug.—Sept.	
<i>Acalypha glabrata</i> var. pilosior.	Nov.—Dec.—Jan.—Feb.	1 plant in full flr May.
<i>Antherothamnus rigida</i> (<i>syn. A. pearsonii</i>).	Oct., Dec., June.	Oct. and Dec. flrgs heavy; June scanty.
<i>Artemisia afra</i> ..	Apl.	
<i>Bauhinia macrantha</i> ..	Nov.	
<i>Becium angustifolium</i> ..	May.	

Species.	Months of Flowering.	Remarks.
<i>Blumea gariepina</i> ..	July.	
<i>Boscia albitrunca</i> ..	Oct.	
<i>Bridelia mollis</i> ..	March.	
<i>Burkea africana</i> ..	—	A poor flr year for this sp. Did not fr.
<i>Canthium huillense</i> ..	Nov.—Dec.	
<i>Carissa bispinosa</i> ..	Oct.	
<i>Celtis kraussiana</i> ..	Sept.	
<i>Chrysophyllum magal- ismontanum</i> .	Oct., Dec., Sept.	
<i>Combretum apiculatum</i>	Nov.	
<i>C. transvaalense</i> ..	—	Flrd, but not observed.
<i>C. holosericeum</i> ..	Oct., Sept.	
<i>C. zeyheri</i> ..	Oct.	
<i>Corchorus pongolensis</i> ..	Apl., June.	June flrs not fully developed. 1 plant with flrs in Aug.
<i>Croton spp.</i> ..	Oct., Jan.—Feb., Apl.	Oct. the peak month with heavy flr. Flr-buds formed in Dec., 1 or 2 flrs only on each raceme in the other months. Most buds (2—33 per raceme) dormant until Oct.
(<i>C. gratissimus</i> and <i>C.</i> <i>subgratissimus</i>).	—May—June.	
<i>Cryptolepis oblongifolia</i>	Dec.	
<i>Dichrostachys glomerata</i>	Dec., Feb.	In Feb. many plants had both flrs and fruits.
<i>Dombeya rotundifolia</i> ..	Aug.—Sept.	
<i>Dioschoriste transvaalen- sis</i> .	Oct.	
<i>Ehretia hottentotica</i> ..	Nov.—Dec.	
<i>Elephantorrhiza burkei</i>	Oct., Sept.	
<i>Erythrina caffra</i> ..	Aug.—Sept.	1 tree in June—July with flrs, flr-buds and leaves. All trees in flr in Aug., i.e. 1 wild and 6 garden plants. Tree indigenous but almost ex- tinct.
<i>Euclea undulata</i> ..	—	A few plants flrd but not observed.
<i>E. natalensis</i> ..	May—June—July.	1 tree with heavy mass of flrs in May. Others all with sparse crops.
<i>E. racemosa</i> ..	Dec.	
<i>Faurea saligna</i> ..	Jan.	
<i>Gardenia spathulifolia</i> ..	Oct.	A poor flr season. Only 1 tree seen with fruits.
<i>Grewia avellana</i> Hiern. (syn. <i>G. calycina</i> N.E. Br.)	Dec.	
<i>G. flava</i> ..	Oct. — Nov. — Dec. — Jan.—Feb.	
<i>G. flavescens</i> Juss. (in- cludes <i>G. retinervis</i> Burret).	Dec. — Jan. — Feb. — March—Apl.—May.	
<i>G. monticola</i> ..	Dec.—Jan.	
<i>Gymnosporia buxifolia</i>	Oct., Feb., June—July.	1 tree in flr in Dec. Peak month Feb.
<i>G. tenuispina</i> ..	Nov.—Dec.	
<i>Heeria salicina</i> ..	Oct. — Nov. — Dec. — Jan.	2 trees with flrs in Jan.

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Bechuanaland Protectorate.

Species.	Months of Flowering.	Remarks.
<i>Hemizygia elliotii</i> . . .	Oct.	
<i>Heteromorpha trifoliata</i>	Feb.—March—Apl.	
<i>Hibiscus micranthus</i> . .	Oct., March, May—June	
<i>H. subreniformis</i> . . .	Dec., May—June.	
<i>Justicia odora</i>	Jan. — Feb. — March — Apl. — May — June—July.	
<i>Justicia sp.</i>	June.	
<i>Lachnopylis heterotricha</i>	June — July — Aug. — Sept.	
<i>Lantana salvifolia</i> . . .	June, Dec. — Jan. — Feb.	
<i>Lasiosiphon polycephalus</i>	July.	Heavy crop of flrs.
<i>Lippia asperifolia</i> . . .	Oct., Jan — Feb. — March—Apl.—May.	
<i>Lycium sp.</i>	Apl.	
<i>Maerua schinzii</i>	Oct.—Nov.—Dec.	
<i>Melhania acuminata</i> . .	May.	
<i>Mimusops zeyheri</i> . . .	Jan.—Feb.	
<i>Ochna pretoriae</i>	Oct.	
<i>O. pulchra</i>	Oct.	
<i>Olea africana</i>	—	A common tree. None fld.
<i>Osyris abyssinica</i> . . .	July—Aug.—Sept.	2 of the 3 known plants flowered.
<i>Pappea capensis var.</i> <i>radlkoferi.</i>	Jan.—Feb.	A poor flrg season.
<i>Pavetta eylesii.</i>	Dec.	
<i>P. zeyheri</i>	Nov.—Dec.	
<i>Peltophorum africanum</i>	Dec.	A common tree and usually a prolific flowerer. 1 in flr in Nov. and 3 in Dec.
<i>Plumbago zeylanica</i> . .	Feb. — March — Apl. —May—June—July —Aug.—Sept.	
<i>Pouzolzia hypoleuca</i> . .	Nov. Jan.—Feb.	
<i>Psiadia arabica</i>	Oct. — Nov. — Dec. — Jan. — Feb.—March Apl. — May — June —July—Aug.	
<i>Rhamnus zeyheri</i>	Dec.	
<i>Rhigozum brevispinosum</i>	Dec.	
<i>Rhus burchellii</i>	Oct., Feb.	
<i>R. gweinzii</i>	Feb.	
<i>R. lancea</i>	May—June—July.	
<i>R. magalismontanum.</i> . .	Nov., Sept.	2 clumps of plants fld in Sept., possibly through a weak fire passing through them.
<i>Royena sp.</i>	Oct.	
<i>Sclerocarya caffra</i> . . .	Nov.	
<i>Scelopia mundtii</i> ? . . . (<i>S. zeyheri</i> ?)	Feb., Aug.	3 trees which fld in Feb., 1948 fld in July—Aug., 1944. 2 other trees fld in Aug., 1948 and not in Feb., 1948.
<i>Spirostachys africana</i> . .	—	Did not flower.
<i>Strychnos pungens</i> . . .	Dec.	

Species.	Months of Flowering.	Remarks.
Tapiphyllum parvifolium	Nov.	
Tarchonanthus camphoratus	Apl.—May.	
Turraea obtusifolia ..	Dec.—Jan.—Feb.	
Vangueria infausta ..	Oct., Sept.	
Vitex zeyheri ..	Nov.—Dec.	
Ximenia americana ..	Oct., Apl., June—July —Aug.—Sept.	Plants usually bearing a few flrs and many buds during June—Sept.
X. caffra ..	Oct., Sept.	An occasional flr among many buds in Sept.
Zizyphus mucronata ..	Nov., Jan. — Feb. — March.	A poor flrg season for this species.